

REMARKS/ARGUMENTS

Claims 1, 7-9 and 12-13 remain pending. Claims 1 and 8-9 have been currently amended.

Office Action Summary is confusing for Applicant as there is no indication whether Claim 1 is allowed or objected/rejected. For the sake of response, Applicant assumes that Claim 1 is rejected at this stage under the citations.

Applicant respectfully requests reconsideration in light of the following remarks.

Amendments to the Claims

Applicant has amended independent Claims 1 and 9 to overcome the cited prior art. Specifically, Claim 1 has been amended to explicitly state that "the MOS transistor has a source, a drain, and a gate connected together to the node and to one plate of the storage capacitor," and explicitly state that "another plate of the storage capacitor is connected to receive the clock signal of the driving circuit." Claim 9 is similarly amended. The amendment is supported by the originally filed specification and drawing, and thus no new matter is added.

Claim Objections

Claim 8 is objected to because of being dependent on a cancelled claim. Applicant accordingly amends Claim 8 as now being dependent on pending Claim 1.

Rejection of Claims 1, 7, 9 and 12 under 35 U.S.C. 103(a)

Claims 1, 7, 9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Fig. 1 Prior art, in view of Liu (US Patent 5,796,670) and Countryman (US Patent 4,532,611). Applicant respectfully traverses the rejection for the following reasons.

Applicant's Fig. 1 Prior art

Applicant's Fig. 1 Prior art is directed to a pumping circuit, which comprises a current source (11) and a charging capacitor/MOS capacitor (12), connected to provide a pumping voltage (V_{PP}) used as a voltage source for the memory's word line. One primary disadvantage of this Prior art pumping circuit is the large area of the charging capacitor/MOS capacitor (12) required to make sure the driving current is enough for the pumping voltage (V_{PP}).

Liu

Liu is directed to a memory cell (for example, 30 in FIG. 3), which comprises a select transistor (12) and capacitors (22/32). In Liu's memory cell (30), one of the source/drain (18) is connected to bitline (V_{BIT}) and another of the drain/source (20) is connected to the capacitor (22).

Countryman

Countryman is directed to a fusible link or switch (for example, 34 in FIG. 5), through which a defective row of memory cells could be replaced with a redundant row of memory cells. In Countryman's fusible link, two ends of the transistor (36) are open when the fusible link is programmed, and the two ends of the transistor (36) provide a current path when the fusible link is unprogrammed (column 5, lines 27-42). The Countryman's fusible link comprises, among other, a programming transistor (37), which has a gate connected to V_{PP} , and source/drain connected to a load transistor (38) and to a select transistor (39). In Countryman's fusible link, the gate and the source/drain are communicated to each other by way of a load transistor (38).

The Claimed Invention

The claimed invention is directed to a pumping circuit (for example Fig. 2(A)), which comprises a DRAM cell (21), a current source (11), and a driving circuit (13). The DRAM cell (21) is used as a charging capacitor of the pumping circuit, and includes a MOS transistor (211) and a storage capacitor (212). The DRAM cell (21) and the current source (11) are connected at a node (V_{PP}), which provides a pumping voltage (V_{PP}) as a voltage source of a memory's word line. Specifically, in the arrangement of the DRAM cell (21), the MOS transistor (211) has a source, a drain, and a gate connected together to the node (V_{PP}) and to one plate of the storage capacitor (212). Another plate of the storage capacitor (212) is connected to receive the clock signal θ_2 of the driving circuit (13). One primary advantage of the claimed invention, compared to the Applicant's Fig. 1 Prior art, is the reduced area of the charging capacitor/DRAM cell (21) required to make sure the driving current is enough for the pumping voltage (V_{PP}).

Argument

The withdrawal of the rejection is respectfully requested at least on four grounds.

Firstly, as expounded above, Applicant's Fig. 1 Prior art is directed to a pumping circuit, whereas Liu is directed to a memory cell. Applicant respectfully notes that "pumping circuit" and "memory cell" are two distinct subjects with respective and different technical disciplines. Accordingly, a person skilled in the pertinent art would not modify Applicant's Prior art by Liu without hindsight. Specifically, skilled artisan would not utilize Liu's "memory cell" to replace Applicant Prior art's charging capacitor (12 in Fig. 1) of the "pumping circuit" at the time of the invention.

For the similar reasons, Countryman is directed to a fusible link, which is a subject with technical discipline dramatically different from that of Applicant's Prior art, and different from that of Liu. Accordingly, a person skilled in the pertinent art would not modify Applicant's Prior art by Countryman or/and Liu without hindsight. Specifically, skilled artisan would not utilize the transistor (37 in FIG. 5) of Countryman's "fusible link" to replace the transistor (12 in FIG. 3)

of Liu's "memory cell," or to replace Applicant Prior art's charging capacitor (12 in Fig. 1) of the "pumping circuit" at the time of the invention.

Secondly, as asserted at the second paragraph, page 3 of the Office action, Examiner alleges it would be obvious to one of ordinary skill in the art to utilize Liu's memory cell in place of Applicant Prior art's charging capacitor "for the purpose (or incentive) of providing high data storage capacity and low power consumption." Applicant respectfully submits that Examiner's such assertion lacks basis of evidence, and thus there is no incentive to modify Applicant's Prior art by Liu. Specifically, the whole disclosure of Applicant Prior art, explicitly or implicitly, has nothing to do with "data storage capacity" nor with "power consumption." While Liu is for the purpose of providing high data storage capacity and low power consumption, Applicant's Prior art, nevertheless, is exclusively directed to the "pumping circuit" for increasing capacitance or area of the capacitor of the "pumping circuit" (but not of the memory cell). According to the disclosure of Liu, Applicant respectfully submits that there is no incentive to modify Applicant's Prior art by Liu.

Thirdly, in addition to the modification by hindsight and lack of incentive to modify as discussed above, Applicant respectfully submits that purpose or technical principle will be defeated if Liu's memory cell (30 in FIG. 3) is in place of Applicant Prior art's charging capacitor (12 in Fig. 1) in reaching the claimed invention. Specifically, Liu's memory cell (30 in FIG. 3) has three terminals—one source/drain (18) coupled to a bitline, a gate (16) connected to a word line, and another plate of the capacitor (32) connected to V_{REF} , which is a DC voltage source (column 7, lines 33-37). To the contrast, Applicant Prior art's charging capacitor (12 in Fig. 1) has two terminals—one terminal connected to provide word line pumping voltage (V_{PP}), and another terminal connected to receive clock signal, which is a non-DC signal source. A person skilled in the art would not know how to replace a two-terminal charging capacitor with a three-terminal memory cell, let along the disparate functions of these terminals. For example, V_{REF} is a DC voltage source, whereas the clock signal is a non-DC signal source. Accordingly, purpose or technical principle will be defeated if

Applicant's Prior art is modified by Liu. As explained in MPEP 2143.01:

If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)

Fourthly, Applicant disagrees with Examiner's assertion that it would be obvious to utilize Countryman's transistor (37) in place of Liu's transistor (12), thereby obtaining the claimed invention. This assertion is respectfully traversed on the following reason. Countryman's transistor (37) has its one end connected to V_{PP} , while another end connected to a transistor (39) that receives control signal S. To the contrary, the claimed invention's MOS transistor (211, for example) has its source, drain, and gate connected together to the node (V_{PP}), while also connected to transfer charge to/from the storage capacitor (212, for example). As the Countryman's transistor (37) is disparate from the Liu's transistor (12) (or the claimed invention's MOS transistor) with respect to their functions and with respect to their connections, it too speculative a leap to conclude that Countryman's transistor (37) would be utilized to modify Liu, and that such modification would result in the claimed invention.

For the foregoing reasons, it is respectfully submitted that Claims 1, 7, 9 and 12 are patentable over Applicant's Fig. 1 Prior art, in view of Liu and Countryman.

Rejection of Claims 8 and 13 under 35 U.S.C. 103(a)

Claims 8 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's Fig. 1 Prior art, in view of Liu and Countryman, and further in view of Hiratsuka (US Patent 5,453,707).

Applicant respectfully traverses the rejection on the same rationale discussed above. Even if Hiratsuka discloses a specific driving circuit, Hiratsuka still does not make up for the deficiency of the Applicant's Prior art modified by Liu/Countryman (if the modification is possible).

CONCLUSION

In light of the above amendments and remarks, Applicant respectfully submits that Claims 1, 7-9 and 12-13 as currently presented are in condition for allowance. Accordingly, reconsideration is respectfully requested.

Respectfully submitted,

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Anthony R. Barkume
Attorney for Applicant
Reg No. 33,831

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20 Gateway Lane
Manorville, NY 11949
631-259-9099